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EXAMINER	
YAM, STEPHEN K	
ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 06/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/954,496	SPIRIN ET AL.
	Examiner	Art Unit
	Stephen Yam	2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10,11 and 15* is/are rejected.

7)☒ Claim(s) *9 and 12-14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 120.

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5)☐ Notice of Informal Patent Application (PTO-152)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6)☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 1, 2, 4, 8, 12, 14, and 15 are objected to because of the following informalities:

In Claim 1, line 16, "optic beamsplitter" should be replaced by "said fiber optic beamsplitter" for correct grammar and use of an article. Applicant is recommended to use consistent terminology along the claim language

In Claim 1, lines 19-20, "the light flux" is ambiguous, as it appears that the two detectors sense different (reflected vs. transmitted) light fluxes.

In Claim 1, line 20, "test fiber" lacks a preceding article ("a", "the", "said", etc.), and should be replaced by "said test fiber" or "the test fiber". Applicant is recommended to check the claims to ensure the use of articles.

In Claim 1, lines 25-26, "the disturbance" lacks proper antecedent basis.

In Claim 2, line 3, "the group" lacks proper antecedent basis.

In Claim 4, line 2, "continuously" is misspelled as "continuosly".

In Claim 8, line 4, "light source" lacks a preceding article ("a", "the", "said", etc.), and should be replaced by "said light source" or "the light source". Applicant is recommended to check the claims to ensure the use of articles.

In Claim 8, line 5, "the light source power instability" lacks proper antecedent basis.

In Claim 12, line 5, "second light source" lacks a preceding article ("a", "the", "said", etc.), and should be replaced by "said second light source" or "the second light source". Applicant is recommended to check the claims to ensure the use of articles.

In Claim 14, line 5, "the reflected light decrease" lacks proper antecedent basis.

In Claim 15, line 20, "optic beamsplitter" should be replaced by "said fiber optic beamsplitter" for correct grammar and use of proper article. Applicant is recommended to use consistent terminology along the claim language

In Claim 15, lines 24-25, "the light flux" is ambiguous, as it appears that the two detectors sense different (reflected vs. transmitted) light fluxes.

In Claim 15, line 25, "test fiber" lacks a preceding article ("a", "the", "said", etc.), and should be replaced by "said test fiber" or "the test fiber". Applicant is recommended to check the claims to ensure the use of articles.

In Claim 15, lines 29-30, "the disturbance" lacks proper antecedent basis.

In Claim 15, line 34, "said fiber " lacks proper antecedent basis as the term is previously defined as a "test fiber".

In Claim 15, line 36, the word "between" is repeated.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Regarding Claims 1-6, Dunphy et al. teach (see Fig. 1) a fiber optic sensor comprising a test fiber (26) having a first port (left side of (26)) and a second port (right side of (26)), a light source (10) for producing a beam of light (12) propagating along the test fiber, a fiber optic beamsplitter (14) having a first port (accepting (12)) connected to the light source, a second port (emitting (16)) connected to the first port of the test fiber, and a third port (emitting (37)), a plurality of reflectors (20, 30) positioned along the test fiber and a loss-inducing member (40) positioned along the test fiber, wherein said each of the reflectors is matched to the loss-inducing member, an optical reflection detector (38) for detecting a light flux (37), connected to the third port of optic beamsplitter, wherein the reflection detector is adapted to sense changes in the power of the light reflected from the reflectors, and an optical transmission detector (35) adapted to receive light flux (34), connected to the second port of test fiber, being operable to sense changes in the power of the light transmitted through the test fiber. Regarding Claim 2, Dunphy et al. teach said plurality of reflectors comprises a set of fiber Bragg gratings (see Col. 2, lines 21-24 and 34-45). Regarding Claim 3, Dunphy et al. teach the plurality of reflectors continuously distributed inside the test fiber (see Fig. 1). Regarding Claim 5, Dunphy et al. teach the loss-inducing member as a bending member (see Col. 3, lines 1-7 and Col. 4, lines 8-11). Regarding Claim 6, Dunphy et al. teach the loss-inducing member as a waveguide-sensitive member (see Col. 3, lines 35-42). Dunphy et al. do not teach the fiber optic beamsplitter containing a fourth port, a *plurality* of loss-inducing members wherein at least one reflector is placed between each consecutive loss-inducing member, or a transmission/reflection analyzer to measure the value and identify the location of the disturbance from the transmitted and reflected

distributed inside the test fiber. It is well known in the art that beam-splitters can contain any number of ports depending on the specific application, and Dunphy et al. teach specific transmission and reflection values depending on the disturbance of the fiber (see Col. 3, lines 21-38). Further, Kersey et al. teach (see Fig. 2) a fiber optic sensor comprising a test fiber (214) (see Col. 3, lines 40-46 but incidentally omitted from Fig. 2, but comprised of (216-0, 216-1, ..., 218-01, 218-1, ...)), a beam splitter (204, 212, 220), a plurality of reflectors (218-0, 218-1, ...) positioned along the test fiber and a plurality of loss-inducing members (216-0, 216-1, ...) positioned along the test fiber, wherein said each of the reflectors is matched to each loss-inducing members, wherein at least one reflector is placed between each consecutive loss-inducing members, and an optical reflection detector (222, 224) adapted to sense changes in the power of the light reflected from the reflectors, wherein the plurality of reflectors and loss-induced members are continuously distributed inside the test fiber (see Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of loss-inducing members matched with reflectors as taught by Kersey et al. and provide additional ports in the fiber optic beamsplitter and provide a transmission/reflection analyzer to identify the location of the disturbance along the test fiber in the device of Dunphy et al., to provide a comprehensive analysis of transmitted vs. received power as Dunphy et al. measures, and to provide identification and location of a disturbance in the test fiber as taught by Kersey et al. (see Col. 4, lines 54-58).

Regarding Claim 15, Dunphy et al. teach (see Fig. 1) a method for calculating the value of a disturbance in a system, the method comprising the steps of positioning an optical fiber

(26) having a first port (left side of (26)) and a second port (right side of (26)), a light source (10) for producing a beam of light (12) propagating along the test fiber, a fiber optic beamsplitter (14) having a first port (accepting (12)) connected to the light source, a second port (emitting (16)) connected to the first port of the test fiber, and a third port (emitting (37)), a plurality of reflectors (20, 30) positioned along the test fiber and a loss-inducing member (40) positioned along the test fiber, wherein each of the reflectors is matched to the loss-inducing member, an optical reflection detector (38) for detecting a light flux (37), connected to the third port of optic beamsplitter, wherein the reflection detector is adapted to sense changes in the power of the light reflected from the reflectors, and an optical transmission detector (35) adapted to receive light flux, connected to the second port of test fiber, said transmission detector being operable to sense changes in the power of the light transmitted through the test fiber, detecting a change in light transmission and reflection in said fiber (see Col. 3, lines 21-38). Dunphy et al. do not teach the fiber optic beamsplitter containing a fourth port, a *plurality* of loss-inducing members wherein at least one reflector is placed between each consecutive loss-inducing member, or a transmission/reflection analyzer to measure the value and identify the location of the disturbance from the transmitted and reflected powers. It is well known in the art that beam-splitters can contain any number of ports depending on the specific application, and Dunphy et al. teach specific transmission and reflection values depending on the disturbance of the fiber (see Col. 3, lines 21-38). Further, Kersey et al. teach (see Fig. 2) a fiber optic sensor comprising a test fiber (214) (see Col. 3, lines 40-46 but incidentally omitted from Fig. 2, but comprised of (216-0, 216-1 218-01, 218-1)), a beam splitter (204, 212, 220), a plurality of reflectors (218-0, 218-1,

positioned along the test fiber, wherein said each of the reflectors is matched to each loss-inducing members, wherein at least one reflector is placed between each consecutive loss-inducing members, and an optical reflection detector (222, 224) adapted to sense changes in the power of the light reflected from the reflectors, wherein the plurality of reflectors and loss-induced members are continuously distributed inside the test fiber (see Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of loss-inducing members matched with reflectors as taught by Kersey et al. and provide additional ports in the fiber optic beamsplitter and provide a transmission/reflection analyzer to identify the location of the disturbance along the test fiber in the device of Dunphy et al., to provide a comprehensive analysis of transmitted vs. received power as Dunphy et al. measures, and to provide identification and location of a disturbance in the test fiber as taught by Kersey et al. (see Col. 4, lines 54-58).

3. Claims 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunphy et al. in view of Kersey et al. as applied to Claim 1, further in view of Sentsui et al. US Patent No. 5,202,746.

Dunphy et al. in view of Kersey et al. teach the fiber optic sensor in Claim 1, according to the appropriate paragraph above. Regarding Claim 11, Dunphy et al. teach specific transmission and reflection values depending on the disturbance of the fiber (see Col. 3, lines 21-38). Dunphy et al. and Kersey et al. do not teach a second light source connected to the second port of said test fiber through a second fiber optic beamsplitter, the second beamsplitter having a first port

fiber, a third port connected to said optical transmission detector and a fourth port, or the transmission/reflection analyzer associated with both light sources. Sentsui et al. teach (see Fig. 8) a fiber optic sensor with a test fiber (41) having a first port (left side of (41)) and a second port (right side of (41)), a light source (45), an optical transmission detector (47) to sense changes in the power of the light transmitted through the test fiber, and a second light source (44) connected to the second port of the test fiber, wherein each port of the test fiber contains both a light source and a detector, and the light power from both light sources is analyzed (using 46, 47). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a second light source and analyze data from both light sources as taught by Sentsui et al. along with another fiber optic beamsplitter identical to the first fiber optic beam splitter connected to the second light source, the second port of the test fiber, and the detector in the fiber optic sensor of Dunphy et al. in view of Kersey et al., to provide two-way sensing through the fiber for improved detection sensitivity and accuracy.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunphy et al. in view of Kersey et al. as applied to Claim 1, further in view of Johnson US Patent No. 5,550,730.

Dunphy et al. in view of Kersey et al. teach the fiber optic sensor in Claim 1, according to the appropriate paragraph above. Dunphy et al. and Kersey et al. do not teach a first normalizing optical detector is connected to the fourth port of the fiber optic beamsplitter, said detector adapted to sense changes in the power of light source in order to avoid the influence of the light source power instability. Johnson teaches (see Fig. 1) a fiber optic sensor with a test fiber (13)

propagating along the test fiber, a fiber optic beamsplitter (30) having a first port (to (12)) connected to the light source, a second port (to (13)) connected to the first port of the test fiber, a third port (to (36)), and a fourth port (to (34)), an optical reflection detector (36) for detecting a light flux, connected to the third port of the fiber optic beamsplitter, and a first normalizing optical detector (34) connected to the fourth port of the fiber optic beamsplitter, adapted to sense changes in the power of the light source to provide system stability and synchronization. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the normalizing optical detector of Johnson in the fiber optic sensor of Dunphy et al. in view of Kersey et al., to enhance system stability and synchronization of the source and detectors.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunphy et al. in view of Kersey et al. as applied to Claim 5, further in view of Seitz et al. US Patent No. 5,015,843.

Dunphy et al. in view of Kersey et al. teach the fiber optic sensor in Claim 5, according to the appropriate paragraph above. Dunphy et al. and Kersey et al. do not teach said plurality of bending members including an absorber/expander mechanically coupled to the test fiber to produce a change in transmission of light along the fiber upon absorption of a chemical agent. Seitz et al. teach (see Fig. 1) a fiber optic sensor with a bending member (9) as an absorber/expander mechanically coupled to a test fiber (1,2) to produce a change in transmission of light along the fiber upon absorption of a chemical agent (see Col. 3, lines 47-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the

to provide detection of the presence of an analyte as taught by Seitz et al. (see Col. 3, lines 47-50).

Allowable Subject Matter

6. Claims 9 and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

Regarding Claims 9 and 13, the sensor as claimed, particularly in combination with the reflectors each reflective at a non-overlapping different bandwidth of light, is not disclosed or made obvious by the prior art of record.

Regarding Claim 12, the sensor as claimed, particularly in combination with a first and second normalizing optical detector connected to the left and right side of the test fiber, respectively, is not disclosed or made obvious by the prior art of record.

Regarding Claim 14, the sensor as claimed, particularly in combination with the transmission/reflection analyzer operating under the specific algorithm of $X=T(N-k+1)/N$ for detecting the position of the affected loss-inducing member, is not disclosed or made obvious by the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (703)306-3441. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (703)308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7724 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

SY

SY
June 16, 2003

DAVID PORTA
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